VALIDATION OF A TEST OF MOTOR ABILITY OF PRESCHOOL CHILDREN

by

Emeve Paul Singletary

A Thesis Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Greensboro
July, 1964

Approved by

Director

APPROVAL SHEET

This thesis has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro, Greensboro, North Carolina.

Helen Cannaday
Thesis Director

Oral Examination
Committee Members Evan Engin
Irene Hunham
J. D. Sperry

July 6, 1964
Date of Examination

SINGLETARY, EMEVE PAUL. Validation of a Test of Motor Ability of Preschool Children. (1964) Directed by: Miss Helen Canaday. pp. 61.

The purpose of this study was to validate two batteries of tests, totalling five test items, which were described in a pilot study done by Flinchum (1962). The present study also proposed to investigate measures of motor ability of children between the ages of three years, three months and five years, four months.

Of the forty-four children who participated in this study, twenty-two of the children attended the laboratory nursery school in the School of Home Economics at the University of North Carolina at Greensboro, and twenty-two were enrolled in Greensboro's Parkway Baptist Church Sunday School. Age and availability were the two factors used in selecting the children.

Three examiners were chosen to rate the performance of each child on the two batteries of tests. One examiner was a specialist in physical education and the other two were specialists in the field of child development. Two qualified judges were also selected to rate the motor ability of each child by observing his body movements during informal activities. The examiners and judges were members of the Home Economics and Physical Education faculties at the University.

Two batteries of test items with correlation coefficients above .80 were selected for administration from the

six batteries of tests suggested by Flinchum (1962). The test items included the thirty-five yard dash, the ladder climb, the steps, the tennis ball throw, and the vertical jump. Each of the five test items were administered to the forty-four children and their performance was rated by the three examiners who used a five point scale, ranging from poor to excellent. In addition to these ratings of test performance each child's skill in the performance of informal activities was observed and rated by the two qualified judges who used a five point scale.

The statistic used in analyzing the data was the Pearson product-moment coefficient of correlation. On the basis of the results obtained from the examiners' ratings of the performance of the test items, and of the judges' independent ratings of the children's informal activities, the researcher concluded that the two batteries of tests, totalling five items, seemed to be both reliable and valid measures of motor ability of preschool children. Reliability was measured by inter-examiner correlations of test ratings and by part-whole correlations between individual items and total score for all the examiners combined. Validity was measured by the correlations between the examiners' ratings on the tests and the judges' independent ratings of informal activities.

The researcher also concluded that the test battery would be of value in determining the degree of motor

development of children attending preschool groups. An adequate knowledge of motor skills could be of interest to persons engaged in designing stimulating playground equipment for preschool children. Persons working with preschool children might be interested in a battery of test items for diagnostic purposes.

ACKNOWLEDGEMENTS

The writer wishes to express sincere appreciation to Miss Helen Canaday for the patient guidance, understanding assistance, and encouragement she freely gave throughout the course of the study.

Appreciation is also extended to Dr. I. V. Sperry for his constructive criticism; to Dr. Frances Dunham for her direction of the statistical analysis of the data; and to Miss Ellen Griffin for her assistance in the planning and administration of the test items.

The writer is grateful to the children who so eagerly participated in the testing, and to the faculty members, graduate and undergraduate students who willingly gave their assistance.

The cooperation and understanding of the writer's family is also acknowledged, without which the study could not have been completed.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

THE PROBLEM

The development and measurement of motor ability has, for several decades, received considerable emphasis. Such studies as those of Gesell and Thompson (1934), Cunningham (1927), and Bayley (1936) have contributed to an understanding of the motor abilities and achievements of children three years of age and under. Researchers at the preschool, elementary and secondary levels have attempted to measure achievement in selected motor skills and to establish norms of development in motor performance. In the field of physical education interest has centered on the effects of practice on performance and on the relationship to performance of such factors as height, weight, and age of subjects. While the literature reports reliable and valid tests of motor skills at the upper age levels, the writer has been unable to discover validated tests of motor skills for preschool children.

Statement of the Problem

The purpose of this study was to validate two batteries of test items as described in a study done by Betty Flinchum (1962) in the Department of Physical Education at the University of North Carolina at Greensboro. She used

as subjects the twenty-four children, from three to five years of age, enrolled in the laboratory nursery school in the School of Home Economics at the University. In addition to the attempt to validate the two batteries of tests recommended by Flinchum the present study proposed to investigate the measures of motor ability of children between the ages of three years, three months and five years, four months.

This writer assumed that the motor characteristics of preschool children could be described; that a battery of test items could be of value in measuring these motor characteristics; and that qualified judges could evaluate the preschool child's motor skills through the use of a five point scale. It was hypothesized that the two batteries of test items to be administered were valid measures of the motor competencies of preschool children.

Importance of the Problem

From current literature and available research there was not a readily available validated test for measuring the motor ability of preschool children. Teachers and parents are often confronted with the problem of expecting too little as well as too much in the performance of motor skills at the preschool level. A reliable and valid test of motor performance could be of significant value in contributing to a better understanding of the motor capacities of preschool children and in aiding the teacher in her guidance of children in the development of their motor skills. Adequate

knowledge of motor skills could also be of value to persons interested in selecting stimulating and interesting play equipment for this age level. At present there appears to be little scientific evidence available to guide parents, teachers, and other persons working with preschool children in the selection of play equipment designed to provide for maximum development of large muscles.

Definitions

Several terms are used which have specific meaning in this study. These are defined in this section.

A preschooler is a child who has reached three years, three months in age but who had not yet passed five years, five months in age.

Motor co-ordination refers to the ability of the child to perform certain skills appropriate to his prescribed age level.

Skill involves the ability to perform the assigned test items as perceived by three examiners.

Ability indicates the power to perform the test items within the allotted time and under the directions given.

Judges refer to persons who rated the motor ability of the children on a five point scale using knowledge and past experience as the basis of judgment.

Examiners are the persons who rated the motor skills of the children on a five point scale based on the children's performance of the directed test items.

Organization of the Remainder of the Thesis

In Chapter II a review of related literature is given. It includes characteristics of the three, four, and five year old child, statements of authorities in the field of child development as to the importance of motor competency, and research studies applicable primarily to the preschool child. Chapter III deals with the design of the problem, the selection of the group, the data secured and the treatment of the data. In Chapter IV the findings and interpretations of the findings are reported. Tables are also included in this chapter. In the final chapter, Chapter V, a summarization of results is given and conclusions are drawn. Recommendations for further study are also included in the last chapter.

CHAPTER II

REVIEW OF THE LITERATURE

The review of literature has been divided into three sections. The first section gives a brief over view of the characteristics of three, four, and five year old children with major emphasis on the gross motor characteristics at these ages. The second section includes statements made by some of the leading authorities in the field of child development on the important role motor co-ordination plays in a person's total development. The third section contains reports of research studies of motor skill tests applicable to the preschool age child.

Characteristics of the Preschool Child

The third year of life was described by Gesell (1940) as being a delightful age, a time of transition when infancy gives way to a higher estate. Ilg and Ames (1955) said the three year old child tends to be in good equilibrium with people and surroundings, and he appears to like to conform and to share both objects and experiences. They reported the child typically uses the word "yes" as easily as he formerly used the word "no," and is able to give up a toy or a privilege in order to stay in the good graces of another person. He becomes an interesting group member and

a delightful companion because of his increased language ability and his interest in the language of others. The three year old enjoys new words and can be motivated by words to perform necessary tasks.

In picturing the three year old Gesell (1940) stated that the three year old, like the two year old, enjoys gross motor activity but not exclusively so. He also reported the three year old as playing in a sedentary manner for longer periods than the two year old. Gesell (1940, pp. 41-42) continued by saying:

> Three is more sure and nimble on his feet. He runs with more smoothness, accelerates and decelerates with greater ease, turns sharper corners, negotiates sudden stops. He can go upstairs unaided, alternating his feet. He can jump from the bottom step with both feet together. . . . Three likewise can jump upward with both feet as much as twelve inches. Three pedals a bicycle. An improved sense of balance, as well as cephalocaudal advance, account for the new attainments. There is less sway and toddle in the gait of three and he is much nearer to mastery of the upright posture; he can stand on one foot for a precarious second or more.

Nancy Bayley (1936) cited the following motor accomplishments which children are able to perform during the third year: to walk on tiptoe three meters; to jump from a height of thirty centimeters using a two step platform which is approximately one foot from the floor; to walk a board alternating two or more steps before stepping off; to jump a distance of at least thirty-six centimeters; jump over a rope less than twenty centimeters high.

While the three year old is in a transitional stage,

according to Gesell (1940), the four year old is well on the way to self-dependence. When the three year old child is naive, the four year old child is more sophisticated and dogmatic because of his growing capacity and ability to use words and ideas. Ilg and Ames (1955) suggested that by four years of age the child is "out of bounds" in almost every direction. Verbally he is extremely out of bounds as his language often includes off-color words he uses in order to attract attention and gain social rapport. In interpersonal relations and in the use of his powers of imagination he is also out of bounds. Gesell (1940) reported that the four year old child's fabrications, his bossiness, his dogmatic assertiveness, his alibis, his rationalizations and his clowning are all part of his maturing social insight and that they usually have a favorable connotation.

The motor characteristics of the four year old were described by Gesell (1940, pp. 46-47) in the following manner:

> Four is a more facile runner than three. He is also more able to break up the regular rhythm of his stride. He can make a fair running broad jump and a standing broad jump. . . . Four can also skip . . . . But he cannot hop--much less hop-skip-jump in sequence. He can, however, maintain a one legged equilibrium much longer than can three. He can balance himself on one foot for several seconds. His improved body equilibrium is shown in his excellent performance on the 6 cm. walking board.

The four year old child (Gesell, 1940) likes to attempt and to accomplish motor stunts which were not too difficult. He can perform new athletic feats because of greater

independence of leg musculature. Since his legs, trunk, shoulders, and arms no longer react completely in unison, his joints seem more mobile. This mobility enables the four year old child to hurl a ball with a strong overhand throw.

The following motor accomplishments which four year old children are able to perform were listed by Bayley (1936): to execute a distance jump sixty to eighty-five centimeters; to hop on right foot two or three hops without putting down left foot; and to walk down stairs using alternate feet.

Gesell (1940) reported the five year old child as being more agile and as having more control in general bodily activity than the four year old child. Because of his more mature sense of balance he seems more sure of himself and less cautious on the playground. The five year old child can jump and skip more smoothly. He can stand for long periods on one foot and can balance on his toes for several seconds. The five year old child shows ease and economy of movement and, under wholesome conditions, shows natural grace.

Ilg and Ames (1955) described the five year old child as tending to be reliable, stable and well-adjusted. Because the five year old child feels secure within himself he is calm and friendly, and not overly demanding in social relationships. Gesell (1940) depicted the five year old as

sensitive to social stimulus and one who prefers play with companions to solitary and parallel types of play, and one who enjoys group projects. The five year old child asks fewer and more relevant questions than he asked at four years and he asks questions not merely for the purpose of attention getting or to gain social rapport, but to gain information. Some of the emotional traits and attitudes displayed at five years of age are said to be: seriousness, purposefulness, patience, persistence, carefulness, generosity, friendliness, poise and satisfaction in accomplishment.

Statements of Authorities

The important role motor co-ordination plays in a child's life as he moves from the helplessness of early infancy toward self-help and independence was pointed out by Jersild (1960, p. 94) who said: "Throughout life a person's view of himself is influenced by his perception of his body and its properties, his strength and skill in physical activities." Ausubel (1958, p. 508,9) reported "the motor ability of a child constitutes an important component of his feeling of competence in coping with the environment." He continued by saying: "Motor activity is an important outlet for emotional expression (fear, flight, rage, aggression) and source of basic satisfactions and self-expression."

Almy (1956) reported the three to six year old child tries out, adds to, and develops the basic skills he has

acquired earlier in life and that he tests many and varied powers in a manner dependent partly on physical vigor and the general progress of his development. The child who is awkward and inept would have a different experience from the child who is advanced in muscular co-ordination and skill. Between the years of three and six, the child, by trying out his developing skills, learns what his potentialities might be. The child, whose experience enables him to test his powers as fully and safely as possible, develops an awareness of reality and a confidence in his ability to cope with it.

A statement made by McCandless (1961, p. 277) pointed out the importance of motor development as related to social participation and adjustment. He said "Every facet of social and personal development is affected by the body. The first, although by no means the most profound or important, impression a person makes on others in ordinary social living is likely to be based on his physiognomy and on his body and the way he handles it."

Motor Skill Tests for Young Children

Cowan and Pratt (1934) studied the motor co-ordination of children from three through twelve years of age. The hurdle jump was used to test one hundred and eleven three, four, and five year old children from the preschool group. The results showed that the children could be graded progressively according to Dr. Gesell's system of

developmental grading. Other findings indicated height and weight were not determining factors for the hurdle jump; the median jump increased with chronological age; the hurdle test as administered was a true developmental test of motor coordination; the test had diagnostic value; there was some indication of slight differences in the skill of boys and girls in hurdle jumping. The girls below the age of seven seemed more skilled than the boys, while boys at seven and above seemed more skilled than did the girls. The evidence, however, was inconclusive.

A study done by Hartman (1943) grew out of the Cowan and Pratt test which claimed the hurdle jump to be a single definite measure for estimating the motor performance of children for ages three to twelve inclusive. Hartman proposed to determine the reliability of the hurdle jump and to discover the interrelationship between the jump and certain selected gross motor tasks. The gross motor tasks tested were the jump and reach, standing broad jump, baseball throw for distance, and the thirty-five yard dash. The achievements of fifty-six children between the ages of forty-nine to seventy-eight months on test and retest were recorded. The results showed the tests had high resiability; the hurdle jump, when correlated with the other tests, had a multiple correlation of .64. The multiple correlation of the other four items ranged from .62 to .71. It was concluded that the hurdle jump was not the best

single measure for estimating motor proficiency as other measures were as accurate.

Fales (1937) constructed a rating scale to measure the vigorousness of the preschool child's play activities. On the basis of diary records and observations a list of 651 play activities was obtained and sent to thirty-two judges selected by the experimenter. Replies were received from thirteen judges; however, only ten were used in the final selection. The judges placed the activities in fifty groups; the most vigorous activities in category fifty and the least vigorous in category one. The judges included three psychologists, one physical education instructor, one preschool advisor and five graduate students in child development. The subjects of the study were sixteen boys and sixteen girls from four preschools, paired as closely as possible according to chronological age. A final vigorousness score was determined for each child. These scores showed a range from 7.32 to 20.78, the mean score being 13.28, with a standard deviation of 3.07. The investigator commented on the large variability in vigorousness of the preschool child's play activities.

A study by Goodenough and Smart (1935) investigated the interrelationships of motor abilities in young children. They stated in the introduction that they were also interested in the possible existence of a general factor of motor ability independent of variations in age, sex, physical size

and strength, intelligence and similar traits. In this study done at the Institute of Child Welfare at the University of Minnesota all children attending the nursery school and experimental kindergarten were studied. The children were given a series of brief tests of motor abilities at annual intervals midway between birthdays at ages 2 1/2, 3 1/2, 4 1/2 and 5 1/2. These tests were used: time required to walk a 25 foot line; errors made in walking above line; finger tapping with the comptometer; time required to thread a series of five needles of varying sizes; three hole test; tapping with stylus on metal plate with electrical counter; and simple reaction time. The findings showed a general improvement in scores earned on all tests with advancing age. The boys surpassed the girls at all ages on reaction time but the differences were small. Girls were found to be slightly superior in needle threading and on the three hole test, while boys were possibly superior on tapping tests. The investigators in the findings suggested the use of multiple factor technique for arriving at a quantative analysis.

McCaskill and Wellman (1938) studied common motor achievements at the preschool age. Items selected for administration were: ascending and descending long and short flight of steps and large and small ladders; catching, throwing, bouncing large and small balls; jumping, hopping, skipping, and balancing on path and circle. The test items

were administered to ninety-eight children attending the preschool laboratories at the University of Iowa. The children ranged in age from 26 to 74 months. On retest the week following the first test the reliability of the test battery was .98 ± .004. The investigators attributed the high reliability to the fact that the children perceived the test items as play activities. Motor age assignments were assigned each skill at the point where 50 per cent passed and 50 per cent failed in the performance of the test item. The findings showed a significant gain in ability from one age to the next with few exceptions. Girls appeared superior in hopping and skipping, while boys appeared superior on steps, ladders, and ball activities. Little or no correlation was found between the motor scores of three and four year olds used in this study and ascendance scores.

In a study conducted by Gutteridge (1939) attempts were made to view the development of certain motor skills in children from two to seven years of age. The purpose was to observe the motor development of each child as a whole rather than to secure a measure of skill in any one activity. The investigation sought to portray the child under everyday conditions while engaged in his usual activities. The children were studied in the following activities: climbing, jumping, sliding, tricycling, galloping, skipping, hopping, throwing, bouncing and

catching balls. Cooperating teachers, the investigator and her assistants made ratings and normative observations of the motor performances of the 1,973 children included in the study. A comparison of activities pertinent to ages three to five showed that the proficient use of balls and control of hopping and skipping did not seem to appear before four or five years of age. Proficiency was reached by at least fifty per cent of the children during the third year in climbing, sliding, and tricycling. In the fourth year all the children could tricycle, and over seventy per cent could climb and slide with ease. Boys were more skilled than girls in median achievement rating in activities of climbing, jumping, sliding, skipping, and ball throwing, while girls were ahead in tricycling, galloping, bouncing, and catching balls. The investigator concluded that young children show motor proficiency far in advance of common expectations. The observation was made that it seemed children exhausted the play possibilities of the equipment usually provided for their use and so found "no new worlds to conquer" after the age of four or five years.

A significant study of some of the motor achievements of three hundred children of five, six, and seven years of age was reported by Jenkins (1930). The purpose of the study was to compare the achievements of these children on events typical of activities usually participated in by these age levels. The investigator wished to gain

information which would aid in a better understanding of what to expect in motor ability of five to seven year old children. The events used in the study included skill in speed, balance, throwing and kicking; accuracy in throwing both over and underhand; and jumping both horizontally and vertically. The test events were the thirty-five yard dash, the fifty-foot hop, the bean bag toss for accuracy, the baseball throw for distance, the soccer kick for distance, the baseball throw for accuracy, the standing broad jump, the running broad jump, and the jump and reach. From one to four weeks after the first testing period a retest was run and coefficient correlations were computed between the two test scores. The correlation for the dash was .74 $\pm$ .049; the fifty-foot hop .89 $\pm$ .024; the baseball throw for distance .90 $\pm$ .021; the soccer kick .65 $\pm$ .063; the standing broad jump .82 $\pm$ .036; the running broad jump .75 $\pm$ .050 and the jump and reach .69 $\pm$ .059. The results showed that boys were on the whole superior to girls in all events except the fifty-foot hop. The investigator suggested that the running broad jump, hopping, and the jump and reach would be too difficult for the average child under five years of age to perform. The investigator also stated that results pointed up likenesses and differences in the child's motor skills, in his range of achievement, and his improvement in skill in the events tested.

Betty Flinchum (1962) conducted a pilot study on the

measurement of motor ability of three and four year old children. Twenty-four children enrolled in the laboratory nursery school in the School of Home Economics at the University of North Carolina at Greensboro were given a battery of twelve selected test items. The test items selected for administration were based on direct observations, on motion pictures of the preschool child's motor activity, and on test items found to be reliable measures in previous studies. The twelve items used were the thirty-five yard dash, bean bag throw, soccer kick, tennis ball throw, jump from height of eighteen inches, horizontal or broad jump, vertical jump, shuttle run, ladder climb, steps, low and high balance boards. The results of statistical analysis showed that the dash, ball throw, horizontal jump, vertical jump, ladder climb, and steps were reliable measures of the motor ability of children between three and five years of age. The following conclusions were drawn by the researcher: the motor skills of running, throwing, jumping, and climbing could be tested in the three and four year old child; a motor ability test battery could be used for diagnostic purposes with the preschool child. The following batteries were suggested for use in measuring the motor capabilities of three and four year old children:

Steps
Dash - Steps
Vertical jump - Steps
Throw - Vertical jump
Throw - Vertical jump - Climb
Throw - Horizontal jump - Climb

Summary

The review of literature was divided into three sections. In the first section some of the characteristics of three, four, and five year old children were reviewed with major emphasis on gross motor characteristics. For this purpose the works of Gesell (1940) and Ilg and Ames (1955) were found to be comprehensive sources. The second section consisted of statements made by several authorities in the field of child development as to the important part played by motor co-ordination in the life of an individual. Statements made by Jersild (1960), Ausubel (1958), McCandless (1961) and Almy (1956) pointed up this factor. The third section of the review consisted of research studies related to the present study. Of the studies reviewed the most pertinent to the subject under investigation appeared to be the studies conducted by Gutteridge (1939), Jenkins (1930), McCaskill and Wellman (1938) and Flinchum (1962).

CHAPTER III

PROCEDURE

Selection of Subjects

Forty-four children ranging in age from three years, three months through five years, four months were the subjects used in the study. Twenty-two of these children were enrolled in the laboratory nursery school of the School of Home Economics of the University of North Carolina at Greensboro, and the remaining twenty-two were members of Greensboro's Parkway Baptist Church Sunday School. The latter group of children were not enrolled in a week-day play school. Age and availability of the children were the only two selection factors of concern in the study. The nursery school children ranged in age from three years, six months through five years, four months and the Sunday school children ranged in age from three years, three months through five years, four months. The Parkway Baptist Church Sunday School group was selected for use in the study because of willing parental cooperation, and because the children lived in an area from which transportation could be arranged with a minimum of difficulty.

Cooperative Aspects of the Study

Cooperation was needed from the nursery school staff and from the student teachers since they functioned as assistants during the testing sessions. Cooperation was secured from four members of the department of physical education, one of whom served as an examiner, two as judges and one who timed the performance of the children on each test item. Arrangements were made by one of these examiners to use the facilities of the University physical education department for the testing and judging sessions.

A brief explanation of the nature of the study in which the nursery school children were to participate was included in one issue of the semi-monthly nursery school bulletin which was sent to the parents. At this time a report of the study was promised the nursery school parents after the research was completed. The researcher sent letters to the parents of the children in the Parkway Baptist Church group explaining the purpose of the study and enlisting their cooperation. Arrangements for transportation were explained in the letter. The parents were asked to bring their children to the church the morning of test administration. They were told that members of the nursery school staff would transport the children from the church to Coleman Gymnasium at the University, and that they would be transported back to the church after the noon lunch in the nursery school. A copy of the letter to these

parents is included in the Appendix.

Selection of Test Items

Flinchum (1962) suggested using the following six batteries for measuring the motor ability of the preschool child:

Steps
Dash - Steps
Vertical jump - Steps
Throw - Vertical jump
Throw - Vertical jump - Climb
Throw - Horizontal jump - Climb

Of these batteries two with correlation coefficients above .80 were selected for validation by the researcher. The second and fifth batteries consisting of the dash, the steps, the throw, the vertical jump, and the ladder climb were administered since they tested motor skills of running, throwing, jumping, and climbing.

Selection of Examiners

Three examiners were chosen to rate the performance of each child on the two batteries of tests. The three examiners were the same persons who had rated the children's performance during Flinchum's administration of the test batteries. One examiner was a specialist in physical education who had not known the children prior to the testing sessions. The other two examiners, specialists in the field of child development, were well acquainted with the nursery school children. Only one of the three examiners had had previous contact with the children from the Parkway Baptist

Church Sunday School.

Selection of Judges

Two judges were chosen to rate the motor ability of each child by observing his body movements during informal activities. The judges were specialists in the field of physical education who had not known any of the children prior to their participation in the study.

Administration of the Tests

Training sessions were held with the examiners, the judges, the timer, the scorer, and all others who were to assist in any way in the administration of the tests and in the period of observation by the judges. At this time each person familiarized herself with the plans for the procedure and with the part she was to play in it.

Equipment used in the testing was the same used by Flinchum (1962) in her study. The equipment needed for the tests was relatively easy to secure and to set up. All the equipment would be readily available to school groups, with the exception of the vertical jump apparatus.

Name tags were made for the children and were pinned on their backs for easy identification. The nursery school group was assigned numbers while the Parkway Sunday School group was assigned letters. Sheets, designed for each test item, contained spaces for each child's distinguishing number or letter and rating space on a five point scale,

ranging from poor to excellent. These sheets were used by the three examiners who rated each child's performance on each test item. Score sheets were also provided for the scorer who recorded for each child the time used in the performance of each test item or the distance attained.

Sheets were designed for the two judges to rate each child's motor characteristics on a five point scale ranging from poor to excellent. These judgments were made independent of any formal testing. Sample sheets are included in the Appendix.

A brief preliminary testing was held in Coleman Gymnasium of the physical education department approximately one month prior to the day of test administration. Seven nursery school children were observed by a specialist in physical education as they ran, jumped, hopped and climbed steps under informal conditions. The purpose of this pretest was to determine whether or not, through observation of undirected activities, a judgment could be made as to the motor capabilities of a group of preschool children within a prescribed length of time. No formal testing was involved. The specialist in physical education, who was also to function as one of the three examiners during the test administration sessions, concluded it would be possible for judges to rate the motor performance of twenty-two children in an hour's time.

The test apparatus was set up in Coleman Gymnasium

in the physical education department at the University. Space for the thirty-five yard dash was first determined and marked off. Next in order was placed the ladder climb equipment which consisted of one metal ladder and a wooden triangular frame; the third piece of equipment was six stably erected steps constructed of large hollow kindergarten blocks; an area was decided on for the tennis ball throw; and last of all the vertical jump equipment was assembled. Entries in the Appendix contain diagrams of test item equipment, directions for administration of items and for rating of performance.

The forty-two children were transported to Coleman Gymnasium at which point the children were divided into two groups. The twenty-two children from the church were taken down a corridor to nearby Rosenthal Gymnasium. In Rosenthal Gymnasium these children were separated five at a time from the large group of children. The two judges observed while each group of five children participated in informal active play. The judges then rated each child's motor performance on a five point scale.

The nursery school children, during the same period of time, remained in Coleman Gymnasium and were administered four of the five test items. The administration of the test items took longer than the time allotted, therefore the vertical jump was postponed until the following week. As the nursery school children were given the test items the

three examiners, using the prescribed rating sheet, rated each child's motor performance on each item on a five point scale. Upon completion of the four test items, i.e., the thirty-five yard dash, the ladder climb, the steps, and the tennis ball throw, the nursery school children were transported to Rosenthal Gymnasium. There they were observed in groups of five by the two judges who rated their motor characteristics on a five-point scale.

The Parkway Baptist Sunday School children, after being observed in informal play activities, and after being rated by the two judges, were taken to Coleman Gymnasium where they were administered the four test items and where their performance of the items was rated on a five point scale by three examiners.

At the conclusion of the testing session the two groups of children were then transported to the nursery school and were served a picnic lunch at noon. The nursery school children were called for as usual, while the children of the Parkway Baptist Sunday School were returned to the church where their parents called for them.

On the Sunday following the testing session the vertical jump equipment was set up in a hallway at Parkway Baptist Church. The same twenty children were administered this remaining test item and their performance was rated by the three examiners. The two children who were absent from Sunday school were given the test item in the nursery school

the following day. On Monday following the testing session the vertical jump test was administered to the twenty-two nursery school children. Their performance of the vertical jump was rated by the three examiners.

CHAPTER IV

RESULTS

The objectives of this study of the motor ability of preschool children were to validate two test batteries, totalling five items, as described in the Flinchum (1962) study, and to investigate the measures of motor ability of preschool children between the ages of three years, three months and five years, four months. The data were secured as each child's motor performance of five test items was rated by three examiners, who used a five point scale. Additional data were provided as each child was rated on a five-point scale by two qualified judges who observed the motor competencies of each child.

After the data were tabulated the coefficient of correlation was computed to determine the reliability of the judges' ratings of each child's motor ability in informal motor activity. The Pearson product-moment coefficient of correlation was used to describe the degree of relationship between the ratings of $judge_1$ and $judge_2$. A reliability coefficient of .690 was obtained between the ratings given by the two judges of the motor competencies of each child. This correlation was sufficiently high to indicate a reasonable degree of agreement between the two judges.

The same method of correlation was employed to determine the reliabilities of the three examiners who rated directed performance on a five-point scale. Correlation coefficients were computed between the ratings of the three examiners on the performance of each test item. The results of these correlations were consistently high, ranging from .871 to .756 with a difference of .115 between the highest and lowest figures. These correlations indicated reasonable agreement between the examiners' ratings. Results are found in Table 1.

Table 1

Intercorrelations of Examiners' Ratings on Five Items of Motor Coordination Test Battery

Item	E_1-E_2	E_1-E_3	E_2-E_3
Dash	.842	.871	.819
Ladder Climb	.783	.827	.756
Steps	.861	.831	.827
Ball Throw	.798	.821	.786
Vertical Jump	.842	.769	.824
Composite Ratings	.858	.873	.917

N = 44

Reliability coefficients of the composite ratings of the three examiners were sufficiently high that the composite ratings were considered reliable. Data concerning these correlations are found in Table 1.

Correlation coefficients were computed to determine the relationship between individual test items and total scores. These part-whole correlations were uniformly high. Each test item was considered separately in order to provide a more adequate description of the reliability of the tests.

The thirty-five yard dash was performed enthusiastically by the majority of the children. The distance appeared to be of appropriate length. The correlation with the total test was .888.

The ladder climb was interesting to the children and they eagerly followed the instructions given to them. The climb was found to have a correlation with the total test score of .702.

Perhaps one of the most important test items for this age was the steps, which appeared to distinguish between degrees of balance and co-ordination. The part-whole correlation was .781.

The tennis ball throw was popular with the children. Many of the older ones possessed the ability to execute a strong overhand throw. The throw had the lowest correlation with the total test score (.682) of the five test items.

The vertical jump appeared to be a real challenge to the majority of the children; however, its performance was refused by a few. Refusal seemed to be due to the difficulty some children had in grasping the idea of getting

both feet off the floor simultaneously while reaching up to tap the arm of the apparatus, and to the degree of co-ordination essential to the performance of the test item. The vertical jump had the second highest correlation with total score (.831) of the five test items. A summary of correlations on the test items is found in Table 2.

Table 2

Coefficients of Correlation of Individual Test Items and Total Scores

Test Item	Correlation
Dash	.888
Steps	.781
Throw, Tennis Ball	.682
Climb, Ladder	.702
Vertical Jump	.831

N = 44

Of primary interest to the study were the results from the measures of validity which sought to test whether or not the test items measured the motor ability of pre-school children. Correlation coefficients were computed between the ratings of the two judges and the ratings of the three examiners. Sufficiently high relationships were secured that it would seem that the test items were valid. A complete summary of these correlations is found in Table 3.

Table 3

Intercorrelations of Total Ratings of Examiners and Judges on Five Test Items

	E_1	E_2	E_3	J_1
E_2	.858			
E_3	.873	.917		
J_1	.595	.645	.763	
J_2	.678	.715	.703	.690

N = 44

The mean score for each age group on each item was computed. There appeared to be a progression of skill with advancing age in each instance except two. A slight regression was shown in the performance of the dash. The mean score for children three years, ten months through four years, three months of age on the dash was 3.78, while the mean score for children four years, four months through four years, nine months of age was 3.59, a difference of .19. The second exception was found in the performance of the vertical jump with the same age group. The mean score for children three years, ten months through four years, three months of age was 3.28, while children four years, four months through four years, nine months of age had a mean score of 3.24. There was a very slight difference of .04. Data concerning mean scores are found in Table 4.

Table 4

Mean Scores for Each Age Group on Each Test Item and Total Mean Scores

Age Groups	N	Dash	Climb	Steps	Throw	Vertical Jump	Total Mean Scores
3,3 - 3,9	13	3.29	3.25	3.05	3.00	2.28	2.97
3,10 - 4,3	13	3.78	3.29	3.41	3.35	3.28	3.42
4,4 - 4,9	10	3.59	3.54	3.94	3.39	3.24	3.54
4,10 - 5,4	8	4.62	4.03	4.20	3.48	4.18	4.10
Total	44						

The total mean score for each age group was also computed. In comparing the mean scores there appeared to be a progression in motor performance from the youngest children to the oldest ones. The youngest age group had a total mean score of 2.97, while the oldest age group had a total mean score of 4.10, a difference of 1.13 between the two groups. This would indicate that there was a progression of gross motor ability with increasing age of the child. Information concerning total mean scores is found in Table 4.

The study suggests that these five items from the Flinchum (1962) study are both reliable and valid measures of motor ability of preschool children.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to validate two batteries of tests totaling five test items. These items were described in the Flinchum (1962) study. The present study also proposed to investigate the measures of motor ability of children between the ages of three years, three months and five years, four months. The test items suggested by Flinchum for use in measuring motor ability of the pre-school child included the thirty-five yard dash, the ladder climb, the steps, the tennis ball throw, and the vertical jump.

The children who participated in the study were twenty-two children who attended the laboratory nursery school in the School of Home Economics at the University of North Carolina at Greensboro, and twenty-two children who were enrolled in Greensboro's Parkway Baptist Church Sunday School. Because of transportation problems and the personnel required to supervise children of this age, only children who were enrolled in established groups were included in the study. Age and availability were the two selection factors.

Of the six batteries of test items suggested by Flinchum (1962) for use in measuring motor ability of pre-school children, two test batteries with correlation coefficients above .80 were selected for administration. These two batteries of tests included tasks which were easily administered and which were interesting to the pre-school child. It was possible for every child to perform each test item with some degree of success.

Each of the five test items were administered to the forty-four children and their performance on each item was rated by three examiners who used a five-point scale. Two of the three examiners were acquainted with the nursery school children and one examiner was familiar with the Parkway Sunday School children. Each child's skill in the performance of informal activities was also observed and rated by two qualified judges who used a five-point scale. These judges were unfamiliar to all of the children.

The statistic used in analyzing the date was the Pearson product-moment coefficient of correlation. To obtain a measure of reliability of the judges, the correlation was computed between the ratings of $judge_1$ and $judge_2$. A correlation of .690 was obtained. Measures of reliability were computed between the ratings of the three examiners. The results of the composite ratings were as follows: A correlation of .858 was obtained between $examiner_1$ and $examiner_2$; between $examiner_1$ and $examiner_3$ a correlation of

.873 was found; and a correlation of .917 was obtained between examiner$_2$ and examiner$_3$. A summary of these correlations is found in Table 3.

The individual test items were found to have part-whole correlations sufficiently high to indicate the value of each item in the battery of tests. The dash had a correlation of .888, the ladder climb, steps, tennis ball throw, and vertical jump had correlations of .702, .781, .682, .831, respectively. The vertical jump had the second highest correlation of the five test items. Jenkins (1930) suggested, in her study of the motor achievements of children five to seven years of age, that the vertical jump would doubtless be unduly hard for the average child under five years of age to perform, as it required a type of coordination especially difficult for young children.

The chief concern of this present study was to determine whether or not the five test items measured motor ability of preschool children; and to discover if performance of the test items by the children, as rated by three examiners, were valid measures of motor ability as judged by their correlations with the independent judgments of two qualified judges. Sufficiently high intercorrelations of the ratings of the examiners and judges were found to suggest validity of the test battery.

There appeared to be a progression of skill in the mean motor performance of each test item with advancing age.

The only exceptions occurred in the performance of the dash and the vertical jump where slight regressions were shown at one age. Mean scores on the dash and vertical jump for children three years, ten months through four years, three months of age were higher by .19 and .04, respectively, than the mean scores of the same test items for children four years, four months, through four years, nine months of age.

When the total mean scores were computed for each age group, a progression of motor performance was shown from the youngest to the oldest age group. The total mean score of the youngest age group was 2.97, while the oldest age group had a total mean score of 4.10, a difference of 1.13 between the two groups. The results suggested that there was a progression of gross motor ability with increasing age of the child. Information concerning mean scores is found in Table 4.

Conclusions

Although the evidence presented in this study was based on a limited group of preschool children, with age and availability the only two selection factors, the following conclusions seemed justified.

On the basis of the results obtained from the examiners' ratings of the performance of the test items, and of the judges' independent ratings of the children's informal activities, the researcher concluded that the two batteries of tests, totalling five items, seemed to be both

reliable and valid measures of the motor ability of preschool children. Realiability was measured by inter-examiner correlations of test ratings (Table 3) and by part-whole correlations between individual items and total score for all the examiners combined (Table 2). Validity was measured by the correlations between the examiner's ratings on the tests and the judges' independent ratings of informal activities (Table 3).

The researcher also concluded that the test battery would be of value in determining the degree of motor development of children attending preschool groups. An adequate knowledge of motor skills could be of interest to persons engaged in designing stimulating playground equipment for preschool children. Persons working with preschool children might be interested in a battery of test items for diagnostic purposes.

Recommendations for Further Study

It is recommended that further studies should be done in the area of motor development. A study to determine the differences in the motor performance of preschool boys and girls would be of value. Due to more nearly equal opportunities for boys and girls at this age level to use a variety of playground equipment in similar ways, differences in performance by children reported in the literature might prove to be no longer accurate.

A further study might be to investigate the motor

development of the children included in this present study after a lapse of a few years. It would be interesting to discover if excellence of performance or lack of excellence in this present study had been maintained through the intervening years.

A final study of value would be to establish norms of motor skills for preschool children and thus contribute to a better understanding of the motor capabilities of this age.

The motor ability of preschool children is measurable. Because valid and reliable tests can be constructed this is an area in which research studies should continually be developed.

LIST OF REFERENCES

LIST OF REFERENCES

Almy, Milly C. Child development. New York: Holt, 1956.

Ausubel, D. P. Theory and problems of child development. New York: Grune and Stratton, 1958.

Bayley, Nancy. The development of motor abilities during the first three years. Monographs of the Society for Research in Child Developm., 1936, i (I), 1-26.

Cowan, Edwina A., and Pratt, Bertha M. The hurdle jump as a developmental and diagnostic test of motor co-ordination for children from three to twelve years of age. Child Develpm., 1934, 5, 107-121.

Cunningham, Bess. An experiment in measuring gross motor development of infants and young children. J. educ. Psychol., 1927, 18, 458-464.

Fales, Evaline. A rating scale of the vigorousness of play activities of preschool children. Child Develpm., 1937, 8, 15-46.

Flinchum, Betty M. A pilot study in the measurement of the motor of the preschool child. (Unpublished master's thesis, Univ. of North Carolina at Greensboro, 1962) p. 77.

Gesell, A. The first five years of life. New York: Harper, 1940.

Gesell, A., and Thompson, Helen. Infant behavior. Its genesis and growth. New York: McGraw-Hill, 1934.

Goodenough, Florence L., and Smart, R. C. Inter-relationships of motor abilities in young children. Child Develpm., 1935, 6, 141-153.

Gutteridge, M. V. A study of motor achievements of young children. Arch. Psychol., 1939, 34 (244), 5-169.

Hartman, Doris M. The hurdle jump as a measure of motor proficiency. Child Develpm., 1943, 14, 201-211.

Ilg, Frances L., and Ames, Louise B. The Gesell Institute's child behavior. New York: Dell, 1955.

Jenkins, Lulu M. A comparative study of motor achievements of children five, six, and seven years of age. New York: Bureau of Publications, Teacher's College, Columbia Univer., 1930.

Jersild, A. T. Child psychology. New Jersey: Prentice Hall, 1960.

McCandless, B. R. Children and adolescents behavior and development. New York: Holt, Rinehart and Winston, 1961.

McCaskill, Carra L., and Wellman, Beth L. A study of common motor achievements at the preschool ages. Child Develpm., 1938, 9, 141-150.

APPENDIX

University of North Carolina
at Greensboro
School of Home Economics
March 11, 1964

Dear Parents:

In an effort to learn more about motor skills of preschool children a study is being conducted here at the University. The purpose of the study is to learn more about what to expect of young children in physical performances and to gain information which may lead to better planning of playgrounds for preschoolers.

We are asking your permission to give some tests of skill to your preschool child. He will have fun taking them and will be rendering a service which we hope will be of value to many children. The activities will be carried out on Friday, March the twentieth. Children will be transported from Parkway Church to the University and back again to the church by members of the Nursery School staff. A picnic lunch will be served to all participants at the Nursery School. Pick up time at the church will be 8:40 A.M. Children should arrive back at the church by 1:00 P.M.

We hope you will permit your child to participate in this study. Your cooperation and assistance will be appreciated.

_____
Emeve Singletary

_____
Helen Canaday

P. S. Please dress your child in play clothes and rubber soled shoes.

The University of North Carolina
at Greensboro

School of Home Economics

Dear Parents:

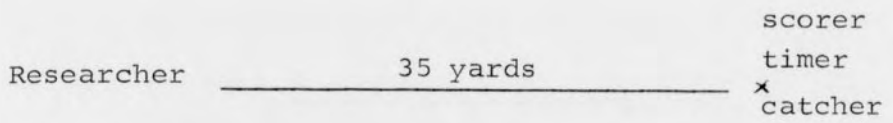
Our experience with the nursery school children last Friday was most interesting. You would have been proud of the way each child willingly and eagerly participated in the tests of motor skills. We want to thank you and the children for helping to make the day possible, and for enabling us to obtain much needed information.

Sincerely,

Emeve Singletary

Helen Canaday

Thirty-Five Yard Dash



Equipment:
Stopwatch
Starting line and finish line

Administrators:
One researcher
One timer
One scorer
One assistant to catch children at finish line

Number of trials:
One trial

Directions to child:
"Do you think you can run very fast this morning? Do you see _____? I want you to run to _____ as fast as you can when I say run. _____ will catch you. Ready, run."

Scoring:
Record the number of seconds consumed in performance of dash.

The child starts quickly and gains speed rapidly. He runs on toes and uses arms in opposition.

Ladder Climb

Equipment:

One six-rung ladder
Support for ladder

Administration:

One researcher
Two assistants
One timer
One scorer

Number of trials:

One trial

Directions to child:

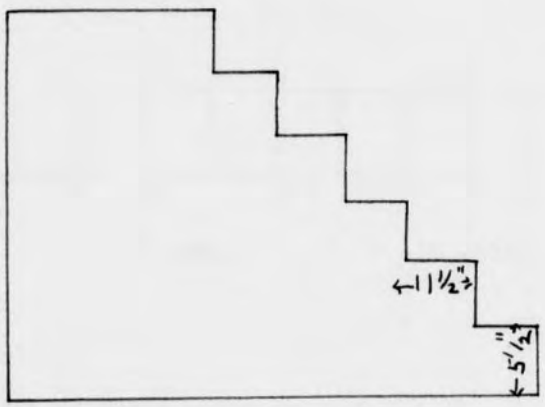
"I want you to climb the ladder to the top, touch Miss _____ hand, and go back down as fast as you can. Ready, climb."

Scoring:

Record the number of seconds it takes child to climb ladder, touch assistant's hand and climb down. Time begins as child's hand touches ladder and ends as one foot touches the floor.

Child climbs without fear; shows strength in pulling up and ease in moving from rung to rung. Child does not mark time.

Steps



Equipment:
Six steps constructed of hollow kindergarten blocks

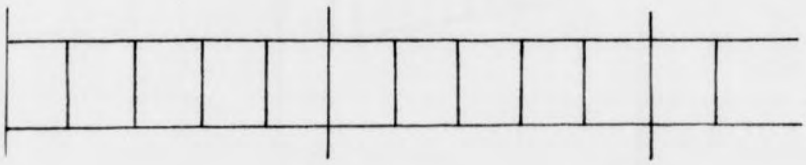
Administration:
One researcher
Two assistants; one to stand on either side of steps
One timer
One scorer

Directions to child:
"I want you to walk up the steps. Walk all the way to the top. Place both feet on the top step, turn around and walk down the steps. Walk as fast as you can."

Scoring:
Record number of seconds used in performance. Time begins as child's foot touches first step, and ends as one foot touches the floor.

The child ascends and descends using alternate foot. He maintains his balance well.

Tennis Ball Throw
Distance



Equipment:
Three tennis balls
Dimensional measuring area

Administrators:
One researcher
Two assistants
One scorer

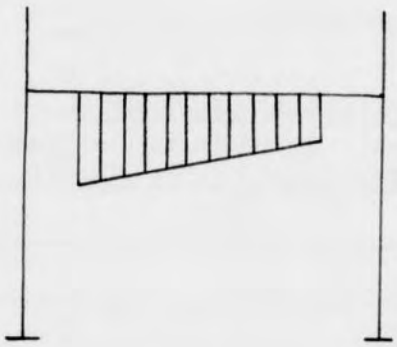
Number of trials:
Three trials

Directions to child:
"I want you to throw this ball. Throw it as far as you can."

Scoring:
Record the distance of the throw in feet and inches.
Best score is recorded.

The child winds up and throws overhand with opposition. He is able to follow through and to get good distance.

Vertical Jump



Equipment:

Measuring device with moveable arm and one inch gradations

Administrators:

One researcher
One scorer

Number of trials:

Three trials

Directions to child:

"See if you can reach this one (indicate). Keep your heels on the floor. Now jump and see if you can hit this one (indicate). Jump as high as you can."

Scoring:

Record height in inches obtained by subtracting height of reach from height attained in highest jump.

Child's weight is distributed on both feet. He flexes his knees and ankles as he prepares for jump and has good extension in reaching.

EXAMINERS' SHEET

TEST ITEM_____ EXAMINER_____

CHILD	Well defined		Modified		Not at all
	Superior (5)	Good (4)	Fair (3)	Poor (2)	(1)

Examiners' Raw Scores on Each Test Item
for Nursery School Children

Child	Dash			Climb			Throw			Steps			Vertical Jump		
	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3
1	5	4	4	4	4	4	3	3	4	4	3	5	4	4	4
2	4	5	5	5	3	4	5	4	5	4	4	3	3	4	3
3	3	3	4	3	3	4	4	3	4	5	4	5	3	4	4
4	4	4	4	4	4	4	3	3	3	4	4	4	4	3	3
5	3	3	3	2	4	4	4	5	5	2	3	3	4	4	3
6	4	3	3	5	4	4	4	3	4	4	3	4	3	4	4
7	2	3	2	3	4	4	2	2	2	4	4	4	3	3	3
8	3	4	3	3	3	3	2	4	3	3	3	3	1	1	1
9	2	3	4	2	4	4	3	5	3	3	4	4	2	2	2
10	2	3	3	4	3	3	4	2	2	3	3	2	2	3	3
11	5	5	5	4	3	4	4	3	4	5	4	3	4	4	4
12	3	2	4	3	3	3	3	2	2	4	3	3	3	3	3
13	3	4	4	3	3	3	5	3	4	4	3	3	4	4	4
14	5	5	5	4	4	4	4	5	4	4	4	4	4	4	4
15	5	5	5	5	4	5	5	3	4	5	5	4	3	3	4
16	4	4	4	4	3	4	3	3	3	4	3	4	3	3	3
17	4	3	4	4	3	4	2	2	3	3	3	4	2	2	2
18	5	4	5	5	4	5	3	3	3	5	5	5	5	4	5
20	4	4	4	3	3	3	4	4	5	4	5	5	4	3	3
21	5	5	5	5	4	5	3	3	3	5	5	5	5	3	4
22	3	3	4	4	3	4	2	3	3	4	4	4	2	3	3
23	4	5	4	3	3	3	4	3	5	3	3	4	5	5	4

Examiners' Raw Scores on Each Test Item for Children from Parkway Church

Child	Dash			Climb			Throw			Steps			Vertical Jump		
	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3
A	4	4	4	5	3	4	3	3	4	4	3	2	3	4	4
B	5	5	5	4	3	4	2	3	3	5	4	5	4	4	4
D	5	4	4	4	3	3	5	4	4	5	4	5	4	4	4
E	4	3	4	3	3	2	4	3	4	3	3	2	3	3	3
F	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
G	5	5	5	3	3	3	3	2	2	4	4	5	3	4	4
H	4	4	4	5	3	3	4	3	4	3	3	3	3	4	4
I	3	3	2	3	2	3	3	3	3	3	3	3	2	3	2
J	5	4	5	4	3	3	4	3	4	3	3	4	3	3	3
K	3	3	4	3	3	3	4	3	3	3	3	2	2	3	2
L	4	3	4	3	3	3	3	2	3	3	3	3	1	1	1
M	4	4	4	4	3	3	3	3	4	4	3	4	4	4	4
N	4	3	4	3	3	4	3	3	3	4	3	3	2	3	3
O	5	4	5	4	3	4	3	5	5	4	4	4	3	4	4
P	4	5	5	3	3	3	4	4	4	3	4	4	1	1	1
Q	3	4	3	3	5	4	3	3	3	3	4	4	4	3	4
R	3	3	4	5	4	3	5	5	4	4	3	3	4	5	5
S	5	5	5	5	5	5	4	3	3	5	5	5	5	5	5
T	3	3	4	4	3	3	2	2	2	4	3	3	2	2	3
U	4	3	4	3	3	2	3	3	4	4	3	2	4	4	2
X	1	1	1	3	3	3	3	3	3	3	4	3	3	4	4
Y	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SCORER'S SHEET

TEST ITEM_____ SCORER_____

Child	Time	Measurement	
	Seconds	Feet	Inches

Raw Scores on Five Test Items Given to Children

The raw scores of the test item performance by the children (measurement of distance and time) were not factors of concern in the study; however, since these scores were recorded they were included in the Appendix. The researcher holds the belief that the scores do not represent a true picture of the performance of the children included in the study.

Social response influenced the performance of several children. There were two very noticeable instances. One four year old girl was more interested in the observers present than she was in performing the dash, and she zig-zagged the length of the gymnasium. A three year old boy, after running half the distance in good time, responded to the presence of observers by pretending to be an airplane with sound effects included.

Motivation of the nursery school children to excel might have been a factor influencing performance. It is possible that these children exerted more effort to excel than the children from the church because of familiarity with the researcher.

The factor of fatigue could also have influenced the five test item scores. There is the possibility that the performance scores by the children from Parkway Church were affected because they had spent the first hour in active play in Rosenthal Gymnasium. After this period of active play the five test items were administered and scored.

Time Consumed in Performance of Dash, Climb, and Steps by Nursery School Children

Child	Dash Seconds	Climb Ladder Seconds	Steps Seconds
1	8.5	5.1	6.
2	9.5	6.	8.4
3	11.2	6.5	6.1
4	8.6	5.5	6.
5	19.6	7.2	11.6
6	9.8	11.	6.1
7	9.6	7.5	6.5
8	11.3	13.	10.5
9	10.1	5.2	6.3
10	12.1	11.1	12.4
11	7.3	4.6	7.5
12	12.1	10.4	6.5
13	11.8	18.2	10.1
14	8.8	4.	6.5
15	9.7	4.5	5.5
16	9.7	7.9	10.
17	11.2	9.1	11.2
18	10.2	5.	4.9
20	9.8	11.5	6.3
21	8.5	6.	5.7
22	12.1	9.5	8.7
23	7.5	5.	7.7

Time Consumed in Performance of Dash, Climb and Steps by Children from Parkway Church

Child	Dash Seconds	Climb Ladder Seconds	Steps Seconds
A	10.7	12.6	11.2
B	8.2	14.9	9.5
D	8.7	11.	18.
E	10.6	22.	18.2
F	--	--	25.
G	9.	11.	7.
H	11.2	16.3	10.3
I	10.9	19.2	9.9
J	9.5	12.	8.
K	12.	24.7	12.
L	9.7	11.5	13.2
M	9.4	14.	13.6
N	11.	11.	8.
O	9.2	8.9	5.9
P	8.4	19.5	7.3
Q	10.	6.9	15.3
R	9.5	9.4	8.9
S	7.6	6.5	7.5
T	11.2	18.	13.5
U	9.2	18.3	11.1
X	--	19.	11.
Y	--	--	--

Measurement of Distance in Performance of
Throw and Verticle Jump by
Nursery School Children

Child	Throw		Vertical Jump
	Feet	Inches	Inches
1	26		5
2	13	2	3
3	11	11	6
4	16		6
5	19	3	5
6	12	10	2
7	9	3	5
8	11	1	--
9	26	6	2
10	7		4
11	22	8	6
12	5		3
13	14	4 1/2	7
14	26	7	6
15	10		4
16	10	1	6
17	6	10	2
18	10	9	4
20	31		4
21	23	10	5
22	11	11	3
23	21	8	7

Measurement of Distance in Performance of Throw and Verticle Jump by Children from Parkway Church

Child	Throw		Vertical Jump
	Feet	Inches	Inches
A	12	9	4
B	14	10	5
D	10		6
E	12		4
F	--		--
G	4	8	3
H	9	6	3
I	13	8	1
J	18	5	3
K	9	1	4
L	10	10	--
M	13		1
N		10	3
O	25		4
P	15	6	--
Q	26	4	4
R	25	4	7
S	13	7	5
T	6	11	1
U	10	6	2
X	14	3	4
Y	--	--	--

JUDGES' SHEET

JUDGE _____

CHILD	Superior 5	Fair+ 4	Fair 3	Fair- 2	Poor 1

Raw Scores of Judges for Nursery School Children

Child	$Judge_1$	$Judge_2$
1	4	4
2	4	4
3	4	4
4	3	3
5	3	3
6	3	2
7	2	3
8	3	3
9	3	4
10	3	3
11	3	3
12	2	2
13	5	3
14	4	5
15	3	4
16	4	3
17	3	2
18	3	3
20	4	4
21	5	5
22	3	3
23	3	4

Raw Scores of Judges for Children from Parkway Church

Child	$Judge_1$	$Judge_2$
A	4	4
B	5	3
D	4	4
E	3	3
F	1	1
G	5	4
H	3	3
I	3	4
J	4	4
K	2	3
L	4	3
M	3	4
N	3	3
O	4	5
P	4	3
Q	4	3
R	3	4
S	5	5
T	2	3
U	4	3
X	1	1
Y	1	1